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PROGRAMMABLE ELEMENT WITH SELECTIVELY CONDUCTIVE DOPANT AND METHOD FOR PROGRAMMING SAME

Abstract of the Disclosure

Disclosed is a programmable element including a semiconductor material doped with a dopant that alters the resistance of the element when exposed to actinic radiation. Rather than producing a mechanical deformation, the radiation rearranges the bonding configuration of the dopant in the element, allowing it to be placed on a chip in close proximity to other device structures without risking damage to those structures. After formation, the programmable element is subjected to a laser anneal process in which the dopant is electrically activated. The activation process allows the dopant to donate a charge carrier to the crystal structure. Rapid cooling following laser anneal preserves the desired bonding configuration of the dopant produced in the programmable element. Laser anneals have been shown to reduce the resistivity of a programmable element by at least a factor of two.

Figures